Boas's "The Eskimo of Baffin Land and Hudson Bay" is concluded in Part II. (pp. 371–570, pls. V.–X., figs. 173–269) of Volume XV. of the *Bulletin*. Material gathered by a number of independent observers is shown to yield corroborative evidence for the author's previously expressed conviction that Eskimo culture from Alaska to Greenland formed originally a firm unit; and that differentiations are due to local causes, such as the influence of the coast and Yukon River Indians on the Alaskan Eskimo.

Part V. (pp. 381–498, pls. LIX.–LXXII., figs. 68–118) of Volume XVII. of the *Bulletin* consists of Dr. Roland B. Dixon's monograph, "The Shasta," closely patterned in general mode of treatment on his description of the Northern Maidu. The Shasta are found to share part of their material culture with the tribes of northwestern California, but are fundamentally distinct in religious and social life. A relatively close connection with Oregonian culture is hypothetically advanced.

In Part IV. (pp. 279–454, pls. LVII.–LXXXVIII., figs. 103–180) of Volume XVII. of the *Bulletin* Dr. Kroeber discusses the religious life of the Arapaho. The sun-dance of the northern Arapaho of Wyoming is compared and found essentially identical with that of their southern congeners in Oklahoma, and there is a brief account of old tribal customs. This is followed by a detailed treatment of modern ceremonial objects with descriptions of the crow-dance and the peyote cult, which have superseded the ancient ceremonial organization. After discussing number and color symbolism, the author concludes with a sketch of individual relationship to the supernatural.

Part IV. (pp. 327–401, pls. XXIV.–XXVII., figs. 536–592) Volume III. of the *Memoirs* contains two papers—Lieutenant George T. Emmons's "The Chilkat Blanket" and Professor Franz Boas's "Notes on the Blanket Designs." Emmons describes in detail the process of weaving the ceremonial robe, once characteristic of all the North Pacific coast tribes, but now confined to the Chilkat, a branch of the Tlingit. Boas describes the disposition of design units in the Chilkat blanket, showing that the ornamentation is not influenced by the technique of weaving, but is bodily derived from the decorative surfaces of painted pattern-boards.

Robert H. Lowie

BOTANICAL NOTES

PAPERS ON ARCHEGONIATES

Professor Doctor D. H. Campbell describes in a recent number of *Torreya* some of his experiences in collecting liverworts in Java, "perhaps the most interesting region in the world for the botanical student." On account of the heavy rainfall, and the great range in elevation, from sea-level to an altitude of more than ten thousand feet, the flora is very rich in species as well as individuals. "It is said that there are over fifteen hundred species of trees in the island" which botanists will remember is about double the number we have in North America. In this region Dr. Campbell found the greatest abundance of liverworts, some of remarkable interest.

The same author's paper, "Studies on the Ophioglossaceae" in the *Annales du Jardin Botanique de Buitenzorg* (Vol. VI.) adds materially to our knowledge of the round of life of these low ferns. The prothallia of the two species studied (*Ophioglossum molluscanum* and *O. pendulum*) are "subterranean and normally destitute of chlorophyll." That of the first species is short-lived, while in the second it is "apparently capable of unlimited reproduction by means of detached buds." As to relationship the author says "the nearest affinity of *Ophioglossum* is probably with the *Marattiaceae,* but it is probable that there is also a remote affinity with the *Equisetineae.*"

In a later paper on "The Prothallium of *Kaulfussia* and *Gleichenia,* in the same journal (Vol. VIII.), Dr. Campbell describes and figures the prothallium, antheridium, archegonium and embryo of *Kaulfussia aesculifolia* a somewhat rare fern of the *Marattiaceae* found in the Indo-Malayan region. The prothallium is fleshy and more than one cell in thickness except at the extreme margin, and looks much like the game-

tophyte of *Anthoceros*. In the second part of his paper he shows that the prothallium of *Gleichenia* is more or less lobed, and has a massive midrib. The antheridia usually develop first "but continue to form after the archegonia are mature."

In a still later paper, "Symbiosis in Fern Prothallia" (*American Naturalist*, March, 1908), the same author discusses the significance of the presence in many gametophytes of archegoniates of fungal endophytes. He finds that "an endophytic fungus is normally present in the green prothallia of several *Marattiaceae, Osmundaceae* and *Gleicheniaceae*."

MISCELLANEOUS BOTANICAL PAPERS

The successive numbers of the *Fern Bulletin* show that it is another of the botanical journals that from small and humble beginnings has grown to be one of the periodicals that every botanist must have. The editor has certainly succeeded in making it a readable and helpful journal for all who are interested in ferns. It will be especially helpful to every young botanist.

With the September number, the journal long known as *Forestry and Irrigation* changes its name to *Conservation*. Under the old title many of its articles were of much interest to all botanists excepting perhaps some of the narrower specialists, and the editorial indications are that under its new title this botanical interest will be measurably increased. The ecologist will find much of his kind of botany in it now.

Somewhat allied to the foregoing is Mr. Brown's "Arboriculture," in which the editor gives his ideas about trees and tree-growing in simple, non-technical language, helped out by excellent reproductions of illustrative photographs. The writer of these notes classes this among his valued botanical periodicals.

A new journal, *Southern Woodlands*, published by the Georgia Forest Association, has confessedly a narrower field than the two journals just mentioned. However, in the August number R. M. Harper's article on "Some Neglected Aspects of the Campaign against Swamps" will be read by botanists with pleasure, since it calls attention to the fact that the drainage of swamps is by no means always to be commended; to which every botanist will say "amen."

In line with Mr. Harper's paper is one by Professor Herbert Osborn, entitled "Needed: A System of Aquatic Farming," in the *Popular Science Monthly* for July, suggesting a possible increased usefulness of swamps as swamps, by proper treatment without draining them.

That there is no danger of an immediate exhaustion of problems in the field botany of the higher plants in the vicinity of New York City, is well set forth in a paper on the subject in the July number of *Torreya*. It is worth careful reading by all field botanists.

Incidentally the same author suggests an interesting line of work in his paper on "Some Native Weeds and their Probable Origin" in a recent number of the *Torrey Bulletin*.

Professor Headden, chemist of the Colorado Experiment Station, in Bulletin 131 concludes that the continued use of arsenical sprays is the cause of the "black heart" and certain forms of "root rot" of fruit trees.

RECENT PAPERS ON FUNGI

Professor Atkinson, in a paper on "The Identity of *Polyporus 'applanatus'* of Europe and North America" in *Annales Mycologici*, shows that the *Boletus applanatus* of Persoon (1799) was antedated by *Boletus lipsiensis* of Batsch (1786). Other specific names, as *megaloma* (Lev. 1846), and *leucophaeus* (Mont. 1856), are shown to be synonyms. Finally he shows that Karsen's genus *Ganoderma* probably should include this very common large bracket fungus, so that its name should be *Ganoderma lipsiensis* (Batsch) Atkinson.

Doctor Clinton's Report of the Station Botanist of the Connecticut Experiment Station for the year 1907 contains notes on fungous diseases for the year, a paper on the root-rot of tobacco, and a longer one on certain heteroecious rusts. The report is excellently illustrated.

Several important papers on fungi appear in the Twenty-first Annual Report of the Nebraska Experiment Station, viz., "Some Tomato Fruit-rots during 1907," by Miss V. W. Pool, with ten plates; "A New Form of Sphaeropsis on Apples," by Miss L. B. Walker, with ten text illustrations; "Seed Treatment for the Smuts of Winter Barley," by Dr. F. D. Heald, with four text illustrations; "The Mold of Maple Syrup," by Dr. F. D. Heald and Miss V. W. Pool, with seven text illustrations; "A Rot of Grapes due to *Pestalozzia uvicola*," by F. A. Wolf, with one plate.

An excellent popular description of the "Smuts of Sorghum" by Dr. E. M. Freeman and H. J. C. Umberger is published by the United States Department of Agriculture as Circular No. 8, of the Bureau of Plant Industry.

Charles E. Bessey
The University of Nebraska

GEOLOGY AND RADIOACTIVE SUBSTANCES

A paper of uncommon interest, particularly to geology and geophysics, has just appeared as a *Bulletin of the Geological Society of America* (vol. 19, pp. 113–146). The author, Dr. George F. Becker, of the U. S. Geological Survey, has brought together the physical data upon radioactive substances, reviewed them carefully for the information of any to whom they are not familiar, and then discussed their bearing on the solution of some of the great questions of terrestrial and cosmogonic history.

Assuming that the relation now established between helium, radium and uranium points to the common origin of the chemical elements, Dr. Becker calls attention to the fact that only helium, hydrogen and nebulium have been identified in the nebulæ, and that an orderly progression can be noticed in the atomic weight of the identifiable elements found in the stars. "Helium stars pass by the finest gradations into hydrogen stars of the Sirian type and these again into Solar stars" which contain elements of atomic weight as high as barium (137.4). The spectroscope has never indicated the presence of uranium in any celestial body, in the sun, or in meteoric matter, although helium is widely distributed. Furthermore, the uranium and thorium minerals on the earth are confined to the pegmatitic facies of the granites and syenites. There is, therefore, abundant incentive for a comprehensive investigation of a direct evolution of the elements from lowest to highest atomic weight, and the progress of this evolution will bear the closest relation to the evolution of our present earth.

Dr. Becker does not believe that inferences as to the age of the earth are competently drawn from the ratio of uranium to helium or to lead in particular minerals (Rutherford, Boltwood). Neither does the assembled physical evidence indicate that the high temperature of the interior of the earth is due in any considerable part to radioactivity (Dutton), though perhaps one tenth of the surface temperature gradient may be of such origin. This would accord with the determinations of the earth's age—not far from sixty million years—made by methods independent of the surface temperature-gradient, including his own discussion of a cooling globe printed in Science last February. There are definite limits of depth below which radioactive matter can not be expected and there is a conspicuous absence of uniformity in its distribution, the concentration in the ocean beds being particularly important.

Dr. Becker closes with a new and ingenious theory of the formation of granite which undertakes to account for the enormous energy content of the radioactive group of minerals. Supposing the earth to have sometime presented a surface of rhyolitic or trachytic magma, it may be supposed to have solidified under stable conditions at about 1,300°, surrounded by its atmosphere of water vapor far above the critical temperature of water. It is now assumed that granite must have formed by the surface action of water vapor (aqueo-igneous fusion) upon the rhyolitic or trachytic mass and that the temperature must have fallen below 800° for the stable formation of quartz. In the interval there must have been opportunity for a tremendous potentialization of energy near the